THE CLAIMS

1. In a digitized tomosynthesis method for projecting a 3D volumetric image of an object onto a virtual projection plane, the image being defined by object voxels, in which a ray of energy from a source travels through the object to impinge on an energy sensing image plate having an active area defining an image plane and in which an image is acquired by the energy sensor at successive relative rotational positions of the object and source, wherein a Z axis is defined as the axis of relative rotation of the object, an X axis is defined as relatively horizontal at right angles to the Z axis, a Y axis is defined as relatively vertical at right angles to the X and Z axes, rotation about the X axis is defined as pitch, rotation about the Y axis is defined as yaw , and rotation about the Z axis is defined as roll, and wherein the image plate is parallel with the XZ plane and the source is positioned above the XZ plane with its optical axis defining the center of a radiation cone and intersecting the image plate at approximately its central pixel, the improvement according to which a 3D volumetric image of the object is projected by steps comprising:

computing the coordinate of an object voxel referenced to the image plane;

computing the image plane intercept of the ray of energy from the source through the object voxel; and

projecting a reconstructed 3D volumetric image of the object onto the virtual projection plane.

2. The method of claim 1 in which the coordinate of the object voxel referenced to the image plane is computed by:

defining an object bounding box above the XZ plane that intercepts the radiation cone so that a shadow of the object falls on the active area of the image plate, the position and orientation of the bounding box having a reference point coordinate defined by X, Y, Z, pitch, yaw, and roll;

specifying the coordinate of the voxel referenced to the object bounding box;

rotating the voxel coordinate by the pitch, yaw, and roll of the bounding

box; and

translating the voxel coordinate to the reference point coordinate.

3. The method of claim 2 in which the bounding box has a size and height whereby it includes the volume of interest of the object.

4. The method of claim 2 in which the bounding box and image plate are each rectangular and in which the sides of the bounding box are parallel with the sides of the image plate.

5. The method of claim 1 in which the virtual projection plane comprises an alpha blend plane subdivided into an array of pixel cells, wherein the ray of energy defines a trace thereof representing a virtual sight path ray passing from a view point through one pixel cell of the alpha blend plane to define a view level image.

6. The method of claim 5 in which the array of pixel cells is a rectangular array.

7. The method of claim 5 in which there is a ray trace for each pixel cell of the alpha blend plane for each view level image.

8. The method of claim 5 comprising forming a projected planar view of a selected view level image plane at the alpha blend plane by transferring the image pixel cell value at the intersect of the ray trace and the selected view level plane to the image pixel cell at the intersect of the ray trace and the alpha blend plane.

9. The method of claim 1 in which the steps thereof are performed mathematically and programmed whereby the reconstructed 3D volumetric image is projected by execution of the program on a computer.

10. The method of claim 1 in which a plurality of view level images are formed successively at one image plane.

11. The method of claim 10 wherein the view point and alpha blend plane are translated a level closer to said one image plane for each successive view level.

12. The method of claim 1 in which the 3D volumetric image is stored in a computer memory as an array of pixels represented by a value.

13. The method of claim 12 in which the brightness of each pixel is proportional to the value.

14. The method of claim 1 in which the ray of energy is x-ray radiation.

15. The method of claim 1 in which the energy sensor is a flat panel digital detector.

16. In a digitized tomosynthesis method for projecting a 3D volumetric image of an object onto a virtual projection plane, the image being defined by object voxels, in which a ray of energy from a source travels through the object to impinge on a rectangular energy sensing image plate having an active area defining an image plane and in which an image is acquired by the energy sensor at successive relative rotational positions of the object and source, wherein a Z axis is defined as the axis of relative rotation of the object, an X axis is defined as relatively horizontal at right angles to the Z axis, a Y axis is defined as relatively vertical at right angles to the X and Z axes, rotation about the X axis is defined as pitch, rotation about the Y axis is defined as yaw , and rotation about the Z axis is defined as roll, and wherein the image plate is parallel with the XZ plane and the source is positioned above the XZ plane with its optical axis defining the center of a radiation cone and intersecting the image plate at approximately its central pixel, the improvement according to which the virtual projection plane comprises an alpha blend plane subdivided into a rectangular array of pixel cells, wherein the ray of energy defines a trace thereof representing a virtual sight path ray passing from a view point through one pixel cell of the alpha blend plane to define a view level image, there being a ray trace for each pixel cell for each view level image, and in

which a 3D volumetric image of the object is projected by steps comprising:

computing the coordinate of an object voxel referenced to the image plane by: (a)
defining a rectangular object bounding box above the XZ plane, the bounding box having sides that are parallel with the sides of the image plate and having a size and height that includes the volume of interest of the object, whereby the bounding box intercepts the radiation cone so that a shadow of the object falls on the active area of the image plate, the position and orientation of the bounding box having a reference point coordinate defined by X, Y, Z, pitch, yaw, and roll, (b) specifying the coordinate of the voxel referenced to the object bounding box, (c) rotating the voxel coordinate by the pitch, yaw, and roll of the bounding box, and (d) translating the voxel coordinate to the reference point coordinate;

computing the image plane intercept of the ray of energy from the source through the object voxel; and

forming a plurality of successively selected view level image planes at the alpha blend plane by transferring the image pixel cell values at the intersects of the ray trace and the selected view level planes to the image pixel cells at the intersects of the ray trace and the alpha blend plane, the view point and alpha blend plane being translated a level closer to said one image plane for each successive view level, whereby to project a reconstructed 3D volumetric image of the object onto the virtual projection plane.

17. The method of claim 16 in which the steps thereof are performed mathematically and programmed whereby the reconstructed 3D volumetric image is projected by execution of the program on a computer.

18. The method of claim 16 in which the 3D volumetric image is stored in a computer memory as an array of pixels represented by a value in which the brightness of each pixel is proportional to the value.

19. The method of claim 16 in which the ray of energy is x-ray radiation.

20. The method of claim 16 in which the energy sensor is a flat panel digital detector.